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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,145	06/19/2007	Robert F. Richards	67901-61	8926

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EXAMINER	
DUKE, EMMANUEL E	
ART UNIT	**PAPER NUMBER**
3744	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/579,145	RICHARDS ET AL.	
	Examiner	Art Unit	
	EMMANUEL DUKE	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06/18/2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05/12/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/25/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-9 in the reply filed on June 18th, 2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 *are rejected under 35 U.S.C. 102(**b**) as being anticipated by Jang et al. (**U.S. Patent No. 6,229,121**), hereinafter referred to as Jang et al '121.*

Regarding claim 1, Jang et al. '121 discloses a thermal switch ***(Fig. 1&2: Col 2: lines 19-21)*** for controlling the flow of heat between a heat source ***(22, Col 2, lines 34-35)*** and a heat sink ***(3, Col 2, lines 54-57, wherein a base is a heat sink)***, the thermal switch comprising at least one nanostructure ***(31, Col 2: lines 61-62)***, wherein the thermal switch is configured to alternately form a path of high thermal conductance ***(Fig. 5: Col 3: line 1-4, wherein a normally close mode establishes a path of high***

thermal conductance) between the heat source and the heat sink via the at least one nanostructure, and a path of low thermal conductance ***(Fig. 4: Col 3: lines 1-4, wherein a normally open mode establishes a path of low thermal conductance)*** between the heat source and the heat sink.

Regarding claim 2, Jang et al. '121 discloses the thermal switch of claim 1, further comprising an actuator ***(Col 2: lines 40-45)*** configured to alternately move between a first position ***(Fig. 5: Col 3: line 1-4, wherein a close position is a first position)*** to form the path of high thermal conductance and a second position ***(Fig. 4: Col 3: line 1-4, wherein an open position is a second position)*** to form the path of low thermal conductance.

Regarding claim 3, Jang et al. '121 discloses the thermal switch of claim 2, wherein the actuator is deflectable ***(as shown in Fig. 5)*** to alternately deflect between the first position in which the actuator contacts ***(Fig. 5: Col 2, lines 58-62)*** the at least one nanostructure ***(31)*** to form the path of high thermal conductance and the second position ***(as shown in Fig. 5)*** in which the actuator is spaced ***(Fig. 5: Col 2, lines 62-65)*** from the at least one nanostructure to form the path of low thermal conductance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 4 *is rejected under 35 U.S.C. 103(a) as being unpatentable over Jang et al '121, in view of Bolleman et al. (**U.S. Patent No. 5,682,075**), hereinafter referred to as Bolleman et al. '075.*

Regarding claim 4, Jang et al. '121 discloses the thermal switch of claim 3; however, he does not explicitly disclose wherein the actuator comprises an electrostatic transducer that deflects to the first position upon application of a voltage to the transducer. Bolleman et al. '075 teaches: wherein an actuator ***(Col 1, lines 33-34)*** comprises an electrostatic transducer ***(Col 1, lines 29-35)*** that deflects to the first position upon application of a voltage ***(Col 1, lines 33-34)*** to the transducer to induce electrostatic attraction between plates.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Jang et al. '121 actuator to include the use of an electrostatic transducer as taught by Bolleman et al. '075 in order to generate vibration with acoustic wave which can serve as a warming sound ***(Bolleman et al. '075 - Col 1, lines 37-40)***.

Claims 5, 8-9 *are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang et al '121, in view of Richards et al. (**U.S. Patent Application Publication No. 2002/0043895**), hereinafter referred to as Richards et al. '895.*

Regarding claim 5, Jang et al. '121 discloses the thermal switch of claim 3; however, he does not explicitly disclose wherein the actuator comprises a piezoelectric transducer that deflects to the first position upon application of a voltage to the transducer. Richards et al. '895 teaches: an actuator ***[0044]*** comprises a piezoelectric transducer ***(10, Fig. 1: [0018], [0044])*** that deflects to the first position upon application of a voltage ***[0044]*** to the transducer.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Jang et al. '121 actuator to include the use of a piezoelectric transducer as taught by Richards et al. '895 in order to harvest kinetic energy and to convert into useful electrical energy ***(Richards et al. '895 – [0073]).***

Regarding claim 8, Jang et al. '121 discloses the thermal switch of claim 1, wherein at least one nanostructure ***(31, Col 2: lines 61-62)*** being disposed in the cavity ***(Fig. 2-5: wherein 31 is shown within a cavity bounded by the mesa structure)***, however, he does not disclose a fluid-tight cavity interposed between the heat sink and the heat source, the at least one nanostructure being disposed in the cavity, and the cavity containing an insulating gas to increase the thermal resistance of the switch whenever the switch is activated to establish the path of low thermal conductance. Richards et al. '895 teaches: a fluid-tight cavity ***(8, Fig. 1: [0012])*** interposed between the heat sink and the heat source, and the cavity containing an insulating gas ***(22, Fig. 2A: [0046], where in compressed vapor is an insulating gas)*** to increase the thermal resistance of the switch whenever the switch is activated ***[0060]*** to establish the path of low thermal conductance. Furthermore, the above technical features of the cited reference bring forth substantially the same technical effect as that of the present invention.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Jang et al. '121 cavity to include the use of a fluid-tight cavity interposed between the heat sink and the heat source as taught by Richards et al. '895 in order to use the increase in internal to force open the switch ***(Richards et al. '895 – [0046]).***

Regarding claim 9, The thermal switch of claim 1, wherein at least one nanostructure ***(31, Col 2: lines 61-62)*** being disposed in the cavity, however, he does not disclose a fluid-tight cavity interposed between the heat sink and the heat source, and the cavity being evacuated to increase the thermal resistance of the switch

whenever the switch is activated to establish the path of low thermal conductance. Richards et al. '895 teaches: disclose a fluid-tight cavity ***(8, Fig. 1: [0012])*** interposed between the heat sink and the heat source, and the cavity being evacuated ***([0046], wherein decrease in working fluid is the cavity being evacuating)*** to increase the thermal resistance of the switch whenever the switch is activated ***([0046], wherein open mode activates switch)*** to establish the path of low thermal conductance. Furthermore, the above technical features of the cited reference bring forth substantially the same technical effect as that of the present invention.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Jang et al. '121 cavity to include the use of a fluid-tight cavity interposed between the heat sink and the heat source as taught by Richards et al. '895 in order to use the increase in internal to force open the switch ***(Richards et al. '895 – [0046]).***

Claims 6-7 *are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang et al '121, in view of Montgomery et al. (**U.S. Patent Application Publication No. 2003/0117770**), hereinafter referred to as Montgomery et al. '770.*

Regarding claim 6, Jang et al. '121 discloses the thermal switch of claim 1; however, he does not explicitly disclose wherein the at least one nanostructure comprises a bundle of carbon nanotubes. Montgomery et al. '770 teaches: one nanostructure comprise a bundle ***(24, Fig. 2-4: [0014)*** of carbon nanotubes ***(24, Fig. 2-4: [0014)*** to improve thermal performance of the thermal switch.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Jang et al. '121 nanostructure to include the use of a bundle of carbon nanotubes as taught by Montgomery et al. '770 in order to substantially increase the thermal conductivity of the thermal switch ***(Montgomery et al. '770 – [0013]).***

Regarding claim 7, the combination of Jang et al. '121 and Montgomery et al. '770 disclose and teach the thermal switch of claim 6, Montgomery et al. '770 further discloses the limitation wherein the at least one nanostructure further comprises a matrix material ***(30, Fig. 2: [0015], wherein a polymeric interstitial material is a matrix material)*** between the carbon nanotubes.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EMMANUEL DUKE whose telephone number is (571)270-5290. The examiner can normally be reached on Monday - Friday; 8:00am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler or Frantz Jules can be reached on 571-272-4834 or 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cheryl J. Tyler/
Supervisory Patent Examiner, Art Unit 3744

EMMANUEL DUKE
Examiner
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07/01/2009